



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/085,409	03/01/2002	Hung-Ming Sun	0941-0421P-SP	6791
2292	7590	12/23/2004	EXAMINER	
BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747			SETH, MANAV	
			ART UNIT	PAPER NUMBER
			2625	

DATE MAILED: 12/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/085,409

Applicant(s)

SUN, HUNG-MING

Examiner

Manav Seth

Art Unit

2625

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 01 March 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi, U.S. Patent No. 6,450,647 and in further view of Ejiri et al., U.S. Patent No. 6,361,171.

**Claim 1** recites "receiving image data including a distorted object image". Takeuchi discloses correcting a distorted image received by correcting the shape of an original image (column 3, lines 52-55).

**Claim 1** further recites "setting at least a distortion parameter pertaining to the image data according to an operational instruction". Takeuchi further discloses of setting distortion correction parameters (column 4, lines 20-25) pertaining to the image data through the commands (instructions) from remote control unit elements 132 and 134 (Figure 2; column 10, lines 22-28).

**Claim 1** further recites the limitations "calculating a plurality of coordinates of corners of the distorted object image according to the distortion parameter; determining a transformation matrix according to the calculated coordinates of the corners of the distorted object image; and, transforming the distorted object image to a corrected

object image according to the transformation matrix". Takeuchi does show in the figures 7(A), 7(B) and 7(C), the change of coordinates of the image according to the distortion parameter but does not specifically teach the steps of calculating a plurality of coordinates of corners of the distorted object image and does not further teach the steps of obtaining the transformation matrix from the coordinates and correcting the distorted image using the transformation matrix.

However, Ejiri discloses correcting keystone distortion in the image (column 6, lines 11-14 and lines 18-21). Ejiri discloses of using a bright spot method to acquire the coordinates of the corners of the distorted image (figures 11 and 13). Ejiri further discloses determining a transformation matrix according to the coordinates of the distorted object image (figure 12; column 6, lines 47-62) whereas the distorted image coordinates are ABCD (figure 9) and further discloses transforming the distorted object image to a corrected object image according to the transforming matrix (column 6, lines 57-62).

Therefore, it would had been obvious to one having ordinary skill in the art at the time of the invention was made to include the steps by Ejiri in the invention of Takeuchi. One would have been motivated to include the steps of Ejiri in the invention of Takeuchi because both references are directed to obtain the corrected distortion image by applying geometrical transformation and Ejiri provides the determination of coordinates of the distorted image which provides the estimate of calculation required to be performed on the distorted image to get to the corrected image. Ejiri further provides the formation of transformation matrix according to the calculated coordinates to further

facilitate the calculation of the geometrical transformation. Simple matrix multiplication can generate a composite matrix that represents a sequence of transformations and use of transformation matrix in the geometrical or affine transformation is well known in the art.

**Claim 2** recites “the method of claim 1, wherein the distortion parameter includes a distorted side of the distorted object image”. Takeuchi discloses horizontal distortion correction parameters for both left and right sides of the distorted image (column 4, lines 20-30).

**Claim 3** recites “the method of claim 1, wherein the distortion parameter includes a distortion ratio of a distorted side of the distorted object image”. Takeuchi discloses the distortion parameter, which includes the correction ratio ( $KRSY = KSSY / IMGY$ ) of the distorted side of the object image (Figure 4(B); column 13, lines 1-2 and lines 29-30).

**Claim 4** recites “the method of claim 1, wherein the distortion parameter includes a location of a distortion central line of the distorted object image”. The applicant in the specification recites the intersection point and this intersection point is the intersection of extensions of the two sides of the image and the applicant further recites the line passing through this intersection (reference point) perpendicular to the base of the image as a central line. Takeuchi discloses of setting an arbitrary point KP on the XY

coordinates (figures 5(A) and 6) and this arbitrary point is the intersection of extensions of the two sides of the image. Takeuchi further discloses of considering this arbitrary point as a reference point to determine the inclination correction (distortion correction) of the image for both sides of the distorted object image (column 14, lines 8-32) and once the side inclinations are corrected, it is obvious that the coordinates of the corrected image can be determined in the same way as disclosed before. It is apparent that such a central line is dependent on the intersection (arbitrary) point (point KP; figures 5(A) and 6) and this intersection point varies in position or location depending on the inclination distortion of the sides of the distorted image and therefore the line (central line) through this intersection point to the base of the image will vary in location according to the distortion parameter of the sides of the image and this location can be determined with respect to intersection (arbitrary) point. Further, the claimed "central line" appears to simply be a point of reference from which the distortion is determined and any point, including the point of Takeuchi, can clearly be used. Therefore, setting the distortion parameter as a location of a distortion central line of the distortion object image will help in determining the location of the intersection point and further implementing the method as disclosed in lines 8-32 of column 14 to correct the distorted image.

**Claim 5** has been analyzed and rejected as per claim 4.

**Claim 6** has been analyzed and rejected as per claims 1, 2, 3 and 4.

**Claim 8** recites "determining a distorted side of the distorted object image and determining a distortion ratio with respect to the distorted side". Takeuchi discloses determining a distortion ratio with respect to the distorted side of the distorted image in figure 4(B) and distortion ratio can only be determined if distorted side is first determined. Further explanation has been provided in the rejection of claims 1, 2 and 3.

**Claim 8** further recites "determining a location of a distortion central line of the distorted object image with respect to the distorted side". This limitation has been analyzed as per claim 4.

**Claim 8** further recites "calculating the coordinates of the corners of the distorted object image according to the distorted side, the location of the distortion central line and the distortion ratio". This claim limitation has been analyzed as per claims 1-6.

3. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Raskar, U.S. Patent No. 6,520,647 in further view of Takeuchi, U.S. Patent No. 6,450,647 and in further view of Ejiri et al., U.S. Patent No. 6,361,171.

**Claim 7** recites "a method of producing an artificial image with perspective distortion, comprising the steps of: receiving image data including an undistorted object image". Rasker discloses obtaining an undistorted object image and then converting this undistorted image to produce an artificial image with perspective distortion (figure 4). Rasker does not teach the internal steps of setting a parameter by an operational

instructional and calculating the coordinates of the corners of the undistorted image and obtaining the transformation matrix to obtain the distorted image.

However, the combined invention of both Takeuchi and Ejiri as explained in the rejection for claim 1 obtains an undistorted image from the distorted image. Claim 7 represents a forward image transformation and whereas claim 1 represents a reverse image transformation and both these transformations are well known in the art. Therefore, it would have been obvious for one skilled in the art at the time of the invention to use the same combined method steps of Takeuchi and Ejiri in the invention of Rasker to obtain the undistorted image from a distorted image. One would have received an undistorted image and then set a parameter such as angle rotation or image side scaling the same way as done and then further performed all the same steps as done in claim 1. Further, it is noted that the designation of "undistorted" and "distorted" is a matter of terminology. For example, in Takeuchi, looking at figures 7A-C, one would assume that Figure 7A is "undistorted" and figure 7C is "distorted", though figure 7C actually depicts the corrected image.

### ***Conclusion***

6. The prior art of record and not relied upon is considered pertinent to applicant's disclosure:



Art Unit: 2625


- Kannappan, IEEE Publication, 1992, "An interleaved scanline algorithm for a 2-D affine transformations of images" (pp. 179-182) discloses a fast and simple algorithm to perform affine transformations on digital images.
- Tamaki et al., U.S. Patent No. 6,791,616, discloses the method for correcting image lens distortion.
- Uchida, U.S. Patent No. 6,324,297, discloses an method of performing perspective transformation on the image to further enhance it.
- Egashira et al., U.S. Patent No. 5,726,716, discloses perspective representation systems for displaying portions of an original picture in a displayable picture.
- Ohtani et al., U.S. Patent No. 5,528,194, discloses an apparatus and method for performing geometric transformations on an input image.
- Marshall et al., U. S. Patent No. 5,933,132 discloses a method and apparatus for calibrating geometrically an optical computer input system.
- Gananathan, U.S. Patent No. 6,511,185, discloses a method and apparatus for compensating a projected image.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Manav Seth whose telephone number is (703) 306-4117. The examiner can normally be reached on Monday to Friday from 8:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta, can be reached on (703) 308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Manav Seth  
Art Unit 2625



BHAVESH M. MEHTA  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600